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FINAL REPORT

FRUIT & NUT SURVEY PHASE II: ASSESSMENT OF HOMEGROWN PRODUCE FOR VOLATILE ORGANIC COMPOUND CONTAMINATION

MAY 11, 2004

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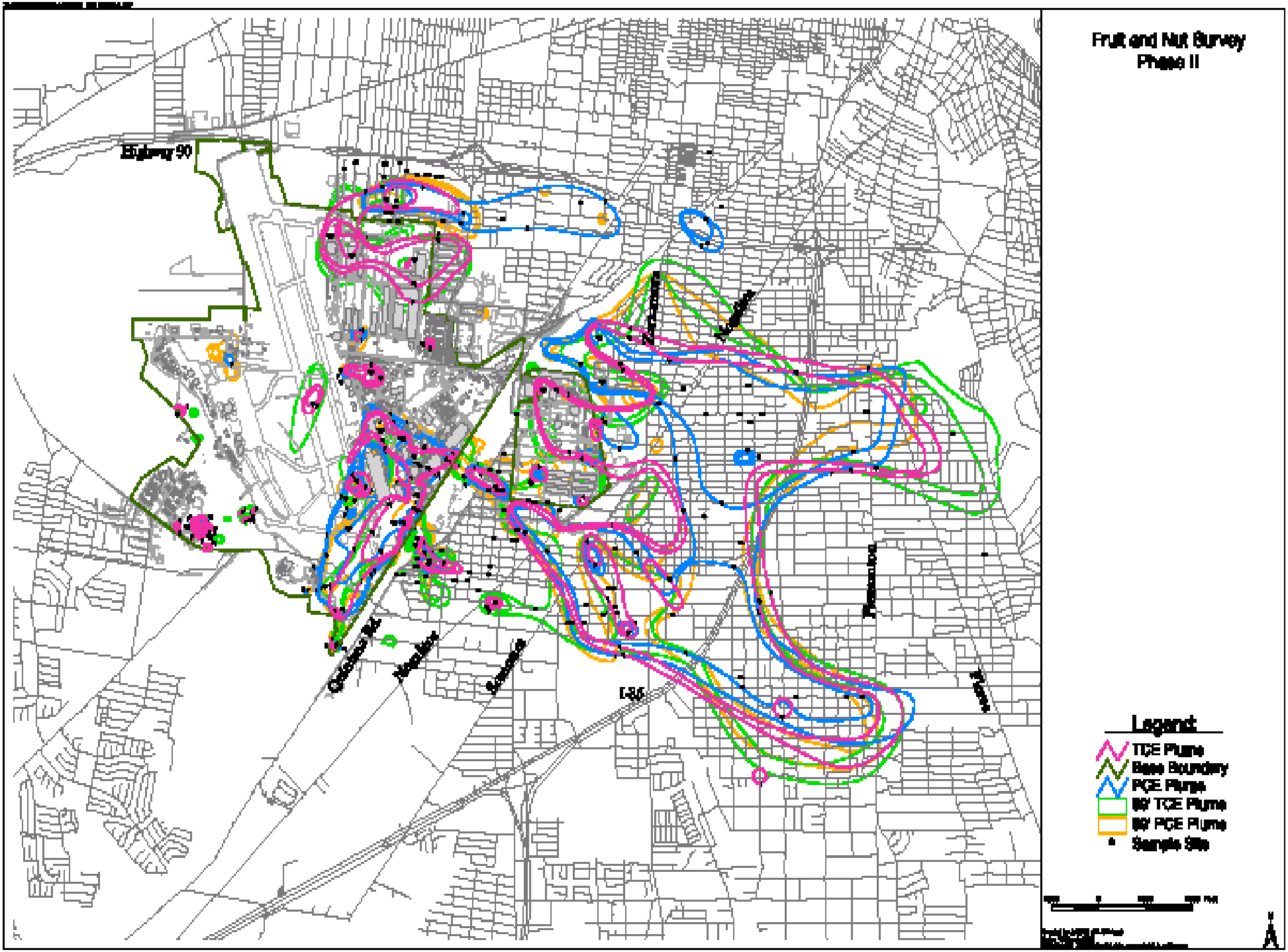
APPENDICES

1.0 PROJECT SUMMARY

The *Fruit & Nut Survey Phase II: Assessment of Homegrown Produce for Volatile Organic Compound Contamination* sampling event is a supplement to the *Kelly Air Force Base Food Chain Sampling Study* conducted in the fall of 2001. Residents of the community surrounding the former Kelly Air Force Base requested further sampling of a seasonal variety of homegrown produce. The San Antonio Metropolitan Health District (Health District), through its Public Center for Environmental Health (PCEH), answered this request by contracting with Southwest Research Institute (SwRI) to collect and analyze seasonal homegrown produce for the presence of the contaminants of concern: tetrachloroethene (PCE), trichloroethylene (TCE), 1,2-dichloroethene (1,2-DCE), and vinyl chloride.

This sampling event consisted of 208 samples of homegrown cacti, tomatoes, bananas, figs, pears, peaches, pecans, and citrus fruit collected during the spring, summer, and fall of 2003 and analyzed for the contaminants of concern by SwRI using EPA Method 8260 *Modified*. Early in the sampling event, interference from the plastic sampling containers was noted. The levels of the interference in these early samples were below detection limits. All of the early samples showing interference were re-sampled using glass jars as sampling containers. All re-sample results were negative for the contaminants of concern, proving the plastic sampling containers had caused the interference seen in the results. The sample results showing interference, 49 samples, were considered to be not valid.

The results of the sampling event indicate that produce grown within the community surrounding the former Kelly Air Force Base is safe to eat. Contaminants of concern were not detected in any of the 159 samples analyzed. However, it is always a good practice to wash all produce before eating, whether homegrown or purchased at the market.


Fruit and Nut Survey
Phase II
Highway 99
I-80
Legend
TCE Plume
Base Boundary
PCE Plume
89' TCE Plume
89' PCE Plume
Sample Site

3.0 INTRODUCTION

Kelly Air Force Base (AFB) was established in 1916 as the first military air base in Texas. It was used as a military depot and a major training base. After World War II, an increased emphasis was placed on the base's depot-level maintenance activities. Kelly AFB managed more than 75 percent of the aircraft and auxiliary engines for the entire U.S. Air Force. It also utilized thousands of gallons of fuels, oils, solvents, and other petroleum products. Past waste management practices at Kelly AFB resulted in several releases of industrial chemical contaminants. The most common contaminants were chlorinated solvents (i.e., PCE, TCE, 1,2-DCE, and vinyl chloride). In 1988, a City of San Antonio Public Works crew encountered underground jet fuel during a street construction project in the Quintana Road neighborhood. This was the first indication that contamination from Kelly AFB had gone beyond the base boundary.

The full extent of the off-base shallow groundwater plume was better defined in 1998. The plume extended four miles east-southeast of the former base lying 10 to 30 feet under 20,000 homes in the community surrounding the former base. The possible routes of human expose to contaminates of concern (i.e., PCE, TCE, 1,2-DCE, and vinyl chloride) are as follows: drinking the shallow groundwater, inhalation of chemicals released to soil gas, or ingestion of chemicals taken up by plants. In 1999, the Air Force Real Property Agency (AFRPA) assumed management of the environmental restoration program. By July 2003, 17 interim remedial measures were in place on the former base. In 2004, the AFRPA plans to have its off-base remedial measures installed in the community surrounding the former base.

The Health District has continued environmental monitoring and testing on behalf of the residents living in the area. The top concern expressed by the residents of the community surrounding the former base is possible health effects. Residents became concerned that VOCs were being absorbed by their homegrown produce and thereby endangering their health through their consumption of that produce.

4.0 PURPOSE

The purpose of this sampling event, *Fruit & Nut Survey Phase II: Assessment of Homegrown Produce for Volatile Organic Compound Contamination*, was to determine if homegrown produce within the community surrounding the former Kelly Air Force Base was absorbing and retaining the contaminants of concern from the shallow aquifer, particularly in any amounts that could adversely effect human health.

5.0 METHOD

5.1 SAMPLING SCHEDULE

The Public Center for Environmental Health's project goal was to collect approximately 200 samples of seasonal fruits, vegetables, and nuts for analysis. The sample locations were identified according to seasonal growth and/or availability. PCEH staff obtained consent to collect samples from the property owners/residents during the spring, summer, and fall of 2003.

5.2 SAMPLING PROCEDURES

5.2.1 SwRI scientists, assisted by PCEH personnel, collected samples from the community surrounding the former base.

5.2.2 Gloves were worn as samples were collected from the tree, plant, or vine.

5.2.3 Samples were placed in collection containers and labeled. Chain of Custody forms were completed, as was field notebook documentation.

5.2.4 Samples were placed on ice for transport to the SwRI laboratory.

5.2.5 The whole fruit, vegetable, or nut was analyzed without peeling, washing, or other alteration.

5.3 ANALYSIS

Southwest Research Institute analyzed the samples for the contaminants of concern using EPA Method 8260 *Modified* [1].

6.0 RESULTS

For each collection event, Southwest Research Institute produced tables recording detected amounts of volatile organic compounds (VOCs) in the samples. The complete VOC panel results are incorporated in this report as Appendix C. It should be noted that these results include chemicals used in the laboratory as well as chemicals naturally occurring in the produce and environment. The samples collected were not peeled or cleaned in any way before analysis; therefore, any VOCs contained in the ambient air and deposited on the skins of the samples would also appear in the results.

The contaminants of concern for the former Kelly Air Force Base as designated by the Texas Commission on Environmental Quality (TCEQ) were the main focus of this sampling event. These contaminants of concern are tetrachloroethene (PCE); trichloroethylene (TCE); 1,2-dichloroethene (1,2-DCE) and vinyl chloride. The results of the final analyses for the contaminants of concern for *Fruit & Nut Survey Phase II: Assessment of Homegrown Produce for Volatile Organic Compound Contamination* conducted during the spring, summer, and fall of 2003 are summarized below:

- Bananas (9) – Contaminants of concern were not detected in any of the banana samples.
- Cacti (56) – Contaminants of concern were not detected in any of the cacti samples
- Citrus (32) – Contaminants of concern were not detected in any of the citrus samples.
- Figs (13) – Contaminants of concern were not detected in any of the fig samples.
- Peaches (9) – Contaminants of concern were not detected in any of the peach samples.
- Pears (9) – Contaminants of concern were not detected in any of the pear samples.
- Pecans (19) – Contaminants of concern were not detected in any of the pecan samples.
- Tomatoes (12) – Contaminants of concern were not detected in any of the tomato samples.

7.0 CONCLUSIONS

The San Antonio Metropolitan Health District's Public Center for Environmental Health (PCEH) collected 208 specimens of homegrown cacti, tomatoes, bananas, figs, pears, peaches, pecans, and citrus fruit at 132 different locations for analysis during the spring, summer, and fall of 2003. While interference from the plastic sampling containers resulted in invalid results in forty-nine samples, subsequent re-sampling analysis using glass sampling containers confirmed that none of these samples had measurable levels of the contaminants of concern.

One lime sampled in the fall of 2001 during the *Kelly Air Force Base Food Chain Sampling Study* [2] contained an estimated level of 2.9 ppb of tetrachloroethene (PCE). The tree did not produce another lime during that growing season for further analysis. During the current sampling event, the same lime tree was sampled and showed no PCE contamination. Plastic sampling containers had been used during the *Kelly Air Force Base Food Chain Sampling Study*. The false positive on the lime sample was most likely due to interference from the plastic sampling container known to have been used in the first study as observed in the current sampling event.

A study by the U.S. Food and Drug Administration (FDA)[3] of foods purchased at retail grocery stores reported volatile organic compounds were found in foods tested between 1996 and 2000, including fruit, vegetables, and nuts. Trichloroethylene (TCE) was detected in one banana sample and one orange sample at 2 ppb. The fact that benzene was detected in all but two of the 70 foods analyzed was attributed to its prevalence in the environment. Additionally, food-packaging materials were thought to contribute to the levels of styrene detected. The FDA study reported that much higher doses of VOCs are inhaled through cigarette smoke, gasoline fumes, and industrial pollution than consumed through foods.

In conclusion, none of the 159 samples of produce were found to contain detectable levels of the contaminants of concern. These results indicate that the homegrown fruit, vegetables, and nuts grown in the community surrounding the former Kelly AFB are safe to eat. However, it is always good practice to wash all produce before eating, whether homegrown or purchased at the market.

8.0 REFERENCES

[1] Southwest Research Institute (SwRI). Modified Method 8260/Solid Phase Microextraction (SPME) Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). Standard operating procedures Oct 2001. San Antonio (TX): SwRI; SwRI TAP 01-0404-045

[2] CH2M Hill. Kelly Air Force Base Food Chain Sampling Study. Final report Feb 2002. San Antonio (TX): CH2M Hill; Contract nr 52826.

[3] Fleming-Jones ME and Smith RE. Volatile Organic Compounds in Foods: A Five Year Study. J Agric Food Chem 2003; 51 (27): 8120-8127.